

## PATENT ABSTRACTS OF JAPAN

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(54) RESIN COMPOSITION, CONTAINER, FILM AND SHEET USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a resin composition having excellent heat resistance and gas barrier properties, capable of packing contents at a high temperature and carrying out a high-temperature sterilization under pressure and to obtain a container, a film and a sheet by using the resin composition.

SOLUTION: This resin composition comprises a thermoplastic polyester (A) consisting essentially of an ethylene terephthalate unit and a polyamide (B) reinforced with a silicate layer. The component A forms a continuous matrix phase and the component B forms a domain phase having 0.1-10  $\mu\text{m}$  average diameter.

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**CLAIMS**

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[Claim(s)]

[Claim 1] A resin composition consisting of thermoplastic polyester (A) which makes an ethylene terephthalate unit a subject, and polyamide (B) reinforced with silicate layers, and (A's) forming a continuation matrix phase, and forming a domain phase of a pitch diameter whose (B) is 0.1-10 micrometers.

[Claim 2] A container, a film, and a sheet which use the resin composition according to claim 1.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention consists of thermoplastic polyester and polyamide reinforced with silicate layers, and relates to the resin composition which can be used as a container and a film excellent in heat resistance and gas barrier property, or a sheet.

[0002]

[Description of the Prior Art] Conventionally polyethylene terephthalate (PET), By the outstanding mechanical property and chemical property, it is observed as a plastic container, film stock, or sheet stock, Progress of biaxial extension blow art, film orientation art, sheet forming art, etc. serves as main raw materials, such as a plastic container for [ in an interval ] the various charges of eating and drinking at the present, a film, and a sheet.

[0003] However, PET has the glass transition temperature near 70 \*\*, and it cannot be said that heat resistance is not necessarily high and is enough also in respect of gas barrier property. When a container is used, it is not a big thing to produce at the time of processing of an extension blow etc. and which can carry out molding strain satisfaction. For example, if a drink is filled up with the bottom of a not less than 65 \*\* elevated temperature, fault, such as causing modification of a container, will be produced. Now, by development of heat setting art or the crystallization art of a container mouth plug part, although the heat resistance is improving at about 85 \*\*, a heat setting and the crystallization treatment of a stopper part take a long time at an elevated temperature, and the cost hike accompanying it poses a problem.

[0004] It was effective only in the high temperature filling under ordinary pressure, and in the pasteurization of a drink containing many the high temperature filling and carbon dioxide under application of pressure, the container with which heat resistance was improved by the above-mentioned post-processing also caused modification of a container, and there was a problem that it could not be used in such a use. Even the point which modification produces on the occasion of the high temperature filling and pasteurization of contents since \*\* is included

[0005] Although the gas barrier property of PET is excellent compared with non halogen system polyolefines, such as polyethylene and polystyrene, it is inferior compared with polyvinyl chloride or a polyvinylidene chloride. Therefore, the use was restricted to especially the charge container of eating and drinking for which the barrier nature of oxygen or carbon dioxide is needed.

[0006] On the other hand, it adds to polyvinyl chloride and a polyvinylidene chloride having insufficient heat resistance, the problem of environmental pollution by a halogen atom being included is pointed out, and it cannot be said that it is suitable as a raw material of a plastic

container or a sheet.

[0007] Thus, the actual condition is that have sufficient heat resistance and advanced gas barrier property, and there is almost no usable raw material in a plastic container, a film, or a sheet.

About the above-mentioned container, the effect of the post-processing cannot necessarily be referred to as enough, either. Then, a multilayered container, a multilayer film, a multilayered sheet, etc. which consist of a raw material layer of a different kind which has a PET layer, heat resistance, or gas barrier property conventionally are proposed.

[0008] For example, the multilayered container which becomes JP,S59-204552,A from a PET layer and the layer of the polyarylate resin constituent excellent in heat resistance is proposed. A plastic swage, 1986, 11 volumes, and 191 The multilayered container which becomes a page from a PET layer and the polymetaxylylene adipamide layer excellent in gas barrier property is proposed. However, these multilayered containers do not carry out simultaneous satisfaction of heat resistance and the gas barrier property.

[0009]

[Problem(s) to be Solved by the Invention] This invention cancels the above-mentioned problem. The purpose is to provide the new resin composition which enables pasteurization under the high temperature filling and application of pressure of contents, when it uses as the resin composition which can be used as a container and a film excellent in heat resistance and gas barrier property, or a sheet, especially a container.

[0010]

[Means for Solving the Problem] When this invention persons distributed polyamide reinforced with specific reinforcement so that it may be in a state specific to thermoplastic polyester as a result of repeating research wholeheartedly, in order to solve an aforementioned problem, they found out that heat resistance and gas barrier property could be raised simultaneously, and reached this invention.

[0011] That is, the gist of this invention is as follows.

(1) Thermoplastic polyester (A) which makes an ethylene terephthalate unit a subject, A resin composition, wherein it consists of polyamide (B) reinforced with silicate layers, (A) forms a continuation matrix phase and (B) forms a domain phase of a pitch diameter which is 0.1-10micrometer.

(2) A container, a film, and a sheet of the above-mentioned (1) description which use a resin composition.

[0012] Hereafter, this invention is explained in detail.

[0013] Thermoplastic polyester (A) which makes a subject an ethylene terephthalate unit in this invention, A main repeating unit consists of ethylene terephthalate, and at a rate not more than 20 mol % of a total acid component Phthalic acid, Isophthalic acid, hexahydrophthalic acid, naphthalene dicarboxylic acid, adipic acid, Polyvalent carboxylic acid, such as dicarboxylic acid components, such as sebacic acid, trimellitic acid, pyromellitic acid, At a rate not more than 20 mol % of all the alcohol components, or a 1,2-propanediol, 1,3-propanediol, 1,4-butanediol, 1,6-hexanediol, Neopentyl glycol, a diethylene glycol, triethylene glycol, Glycol components, such as cyclohexane dimethanol, and trimethylolpropane, Oxy acid ingredients, such as p-oxybenzoic acid and lactic acid, are contained at a rate not more than 20 mol % of all the ingredients of having combined polyhydric alcohol components, such as triethylolpropane and pentaerythritol, or an acid component, and an alcohol component. Such thermoplastic polyester uses together melt polycondensation or solid state polymerization by a conventional method, and is

manufactured.

[0014] Although it is not restricted, if a moldability and performance of a container, a film, a sheet, etc. are taken into consideration, especially intrinsic viscosity of the above-mentioned thermoplastic polyester, Phenol/tetrachloroethane = it is preferred that a value measured at temperature of 25 °C is in the range of 0.5 - 1.5 using 60/40 (weight ratio) of mixed solvents. [0015] Polyamide which is the (B) ingredient in this invention, Melt polymerization (or melt polycondensation) or solid state polymerization according to a monomer which forms polyamide, such as lactam, aminocarboxylic acid, or diamine, dicarboxylic acid (a salt of a couple of them is also contained), to a conventional method is used together, and it is manufactured.

[0016] As an example of a monomer which forms such polyamide, epsilon caprolactam, omega-undecylactam, omega-RAURO lactam, etc. are mentioned as lactam. As aminocarboxylic acid, 6-aminocaproic acid, 11-aminoundecanoic acid, 12-amino dodecanoic acid, p-aminomethyl benzoic acid, etc. are mentioned. As diamine, a tetramethylenediamine, hexamethylenediamine, Nonamethylene diamine, undecamethylene diamine, dodecamethylenediamine, 2,2,4 / 2,4,4-trimethyl hexamethylenediamine, 5-methyl nonamethylene diamine, 2,4-dimethylocta methylenediamine, meta-xylylene diamine, PARAKI silylenediamine, 1,3-bis(aminomethyl)cyclohexane, The 1-amino-3-aminomethyl 3 and 5, 5-trimethylcyclohexane, 3,8-bis(aminomethyl)tricyclodecane, bis(4-aminocyclohexyl)methane, Bis(3-methyl-4-aminocyclohexyl)methane, 2,2-bis(4-aminocyclohexyl)propane, a bis(aminopropyl)piperazine, an aminoethyl piperazine, etc. are mentioned. As dicarboxylic acid, adipic acid, suberic acid, azelaic acid, sebacic acid, Dodecane dicarboxylic acid, terephthalic acid, isophthalic acid, naphthalene dicarboxylic acid, 2-chloroterephthalic acid, 2-methylterephthalic acid, 5-methylisophthalic acid, 5-sodium sulfoisophtharate, hexahydro terephthalic acid, hexahydro isophthalic acid, diglycolic acid, etc. are mentioned.

[0017] As an example of polyamide in this invention, PORIKA pro amide (nylon 6), poly UNDEKAMIDO (Nylon 11), Poly DODEKAMIDO (Nylon 12), polytetra ethylene adipamide (Nylon 46), Polyhexamethylene adipamide (Nylon 66), polyhexamethylene sebacamide (nylon 610), Polyhexamethylene DODEKAMIDO (Nylon 612), polyundecamethylene adipamide (nylon 116), Polytrimethyl hexamethylene adipamide (nylon TMHT/6), polyhexamethylene terephthalamide (nylon 6 T), polyhexamethyleneisophthalamide (nylon 6 I), poly nonamethyleneterephthalamido (nylon 9T), Pori [Bis(4-aminocyclohexyl)methane DODEKAMIDO] (Nylon PACM12), Pori [Bis(3-methyl-4-aminocyclohexyl)methane DODEKAMIDO] (Nylon DMPACM12), polymetaxylylene adipamide (Nylon MXD 6), polyundecamethylene terephthalamide (nylon 11T), polyundecamethylene hexahydro terephthalamide and these copolymers, or these mixtures are mentioned. In these, nylon 6, Nylon 66, Nylon 11, Nylon 12 and these copolymers, or a mixture is preferred, and nylon 6 and this copolymer are preferred at especially a point that cost and performance can be balanced.

[0018] As for especially relative viscosity of the above-mentioned polyamide, although it is not restricted, when a moldability and performance of a container, a film, a sheet, etc. are taken into consideration, it is preferred that a value measured on with temperature of 25 °C and a concentration of 1 g/dl conditions is in the range of 1.5 - 6.0, using 96% concentrated sulfuric acid as a solvent.

[0019] Silicate layers in this invention are basic units which constitute a sheet silicate, and are obtained by carrying out cleavage processing of the swelling sheet silicate, and a length of one side in polyamide. It has a size whose 0.002-1 micrometer and thickness are 6-20Å. Such a swelling sheet silicate may be a natural thing, or may be compounded, and as the example,

Smectite system minerals, such as montmorillonite, beidellite, saponite, hectorite, and a saunonite, Vermiculite system minerals, such as a vermiculite, white mica, black mica, a palagonite, Mica system minerals, such as REBIRAITO and swelling fluoride mica, margarite, a klint night, Brittle mica system minerals, such as Annan Daito, a DOMBA site, SUDOAITO, KUKKEAITO, Hydrous inosilicate system minerals, such as chlorite system minerals, such as KURINOKUROA, a chamossite, and Nima Ito, and sepiolite, etc. mention, and \*\*\*\* in these, Following formula  $\alpha(MF) \cdot \beta(aMgF_2 + bMgO) \cdot \gamma SiO_2$  (among a formula) M expresses sodium or lithium, and  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $a$ , and  $b$  express a coefficient respectively, and are  $0.1 \leq \alpha < 2$ ,  $2 \leq \beta < 3.5$ ,  $3 \leq \gamma < 4$ ,  $0 \leq a < 1$ ,  $0 \leq b < 1$ , and  $a + b = 1$ . A swelling fluoride mica system mineral shown, Montmorillonite is preferred especially in respect of dispersibility in polyamide.

[0020] As a manufacturing method of the above-mentioned swelling fluoride mica, oxidized silicon, magnesium oxide, and various kinds of fluorides are mixed, for example, There is what is called scorification that fuses the mixture thoroughly at temperature of 1400-1500 °C with an electric furnace or a gas furnace, and carries out crystal growth of the fluoride mica system mineral into a reaction vessel by the cooling process. There is a method of carrying out the intercalation of the alkaline ion to this, and obtaining a fluoride mica system mineral, using talc as a starting material (JP, H2-149415, A). By this method, fluoridation alkali or fluoridation alkali is mixed to talc, and it is within a porcelain crucible. A swelling fluoride mica system mineral can be obtained by carrying out short heat-treatment at 700-1200 °C.

[0021] Although a natural article or synthetic compounds may be sufficient as the above-mentioned montmorillonite, especially its sodium montmorillonite is preferred. These may perform elutriation processing and ion exchange treatment (processing which changes ion between layers into sodium), and may raise purity.

[0022] Methods of obtaining polyamide (B) reinforced with silicate layers in this invention include a method of obtaining a swelling sheet silicate and a monomer which forms polyamide by polymerization, for example based on a method indicated to JP, H6-248176, A. There is a method of carrying out organic processing of the swelling sheet silicate first, obtaining a complex based on JP, S63-221125, A, and subsequently obtaining this complex and a monomer which forms polyamide by polymerization.

[0023] If such a method is used, silicate layers will be distributed with a molecular level in polyamide, and a thing excellent in a reinforcing effect will be obtained. About a dispersion state of a molecular level, it can check by specifically performing wide angle X-rays measurement. Namely, although diffraction originating in interlaminar distance (it is  $\frac{1}{d}$  in / usually / the bottom of wet heat J 8-20 Å) of c shaft orientations of a sheet silicate is observed in the state of a raw material, After silicate layers have distributed with a molecular level in polyamide, each class of a sheet silicate exfoliates, a random direction is taken, and it can check by a peak originating in a crystal structure of a sheet silicate no longer being observed as a result. By electron microscope photograph observation, it can also check by seeing a near size of silicate layers in polyamide.

[0024] As for quantity of silicate layers in the (B) ingredient in this invention, it is preferred that it is 0.1 to 30 % of the weight, and it is more preferred that it is 0.2 to 15 % of the weight. This quantity. In less than 0.1 % of the weight, it is difficult to obtain a container etc. with which it is simultaneously satisfied of heat resistance and gas barrier property, and on the other hand, if this quantity exceeds 30 % of the weight, it will become difficult to make a desired domain phase form.

[0025] In a resin composition of this invention, it is required for thermoplastic polyester (A) to

form a continuation matrix phase, and for polyamide (B) reinforced with silicate layers to form a domain phase of a pitch diameter which is 0.1-10 micrometers. When thermoplastic polyester (A) does not form a continuation matrix phase, heat resistance when mold goods, such as a container, are used, and gas barrier property are inferior. A pitch diameter of a domain of polyamide (B) reinforced with silicate layers. When it is less than 0.1 micrometer, compatibility-ization which is two ingredients progresses more than needed, and heat resistance when mold goods, such as a container, are used as a result, and gas barrier property are inferior. When a pitch diameter of a domain of polyamide (B) reinforced with silicate layers exceeds 10 micrometers and mold goods, such as a container, are used on the other hand, a crack arises on the domain surface by stress added at the time of extension, and heat resistance when mold goods, such as a container, are used, and gas barrier property are inferior.

[0026] In a resin composition of this invention, the mixture ratio of an ingredient (A) and an ingredient (B). If it is a range in which an ingredient (B) forms a domain phase of a pitch diameter which is 0.1-10 micrometers into an ingredient (A) which forms a continuation matrix phase, limitation in particular will not be carried out, but usually, Ingredient (A) Ingredients (B) are 1-120 to 100 weight sections. It is the range of a weight section and is the range of 5 - 30 weight section preferably. It is difficult for an ingredient (B) to obtain a container etc. which are simultaneously satisfied with less than one weight section of heat resistance and gas barrier property, and, on the other hand, an ingredient (B) is 120. If a weight section is exceeded, it will become difficult to make a domain phase of desired size form.

[0027] In a resin composition of this invention, various additive agents, such as an inorganic filler, a thermostabilizer, an antioxidant, light stabilizer, fire retardant, a plasticizer, a spray for preventing static electricity, a release agent, a foaming agent, and a nucleating additive, can also be added for the purpose of the improvement in the range which does not spoil the characteristic of this invention.

[0028] A resin composition of this invention is obtained by carrying out melt kneading of a pellet of an ingredient (A), and the pellet of an ingredient (B) using an extrusion machine. In order to make especially a diameter of a domain of an ingredient (B) into the range of this invention, the following biaxial extrusion machines and a method of using a thing of screw constitution are preferred.

(I) A biaxial extrusion machine is (i). Length / diameter (ratio of length to diameter) ratio 25 or more. It is 25-35 preferably, (ii) The 1st feed hopper and (iii) which were provided in the style of [ of an extrusion machine ] Mogami It goes to the downstream from a dice and the 1st feed hopper of (iv) of the lowest style part for extruding an obtained resin composition. What consists of the 2nd feed hopper established in a position of ratio-of-length-to-diameter 15 -20 is used, An ingredient (A) is supplied from the 1st feed hopper, and a method of adding an ingredient (B) on the way from the 2nd feed hopper is taken.

(II) In this case, as screw constitution, it is (i). When it has the 1st kneading zone between the 1st feed hopper and the 2nd feed hopper and the 2nd kneading zone is established in the downstream from the 2nd feed hopper of (ii), the melt kneading effect increases further and it is desirable. A tip part of the 2nd kneading zone is from the 2nd feed hopper to the downstream. It is preferred that it is in a portion of ratio-of-length-to-diameter 1.5-6. and, as for the 2nd kneading zone, it is preferred that ratio of length to diameter should combine continuously four or more kneading disks which are about 1/4. There is no kneading zone, or if it does not have sufficient length, melt kneading of a resinous principle will become insufficient.

[0029] If a cylinder temperature of a biaxial extrusion machine is a temperature by which each

resin is plasticized enough, limitation in particular will not be carried out, but it is an ingredient (A). It is set up according to resin with the higher melting point of an ingredient (B). A constituent obtained by melt kneading is obtained as a strand etc. from a dice, and can be easily pelletized with a strand cutter.

[0030] By an ingredient (B) being added when an ingredient (A) is plasticized to some extent, and carrying out melt kneading further by taking an above-mentioned method. The dispersibility of an ingredient (B) is improved, a diameter of a domain of the range of desired can be obtained, and when mold goods, such as a container, are used, a resin composition with which it is simultaneously satisfied of heat resistance and gas barrier property can be obtained.

[0031] A container of this invention can be obtained by [such as after-heating vacuum forming or compression molding,] carrying out deep drawing, after using as a sheet a resin composition obtained, for example using the above-mentioned extrusion machine. After obtaining direct blow molding or preforming for a resin composition, it can obtain by carrying out biaxial extension of this. After cutting a pipe which obtained it by carrying out extrusion molding of the resin composition to fixed length, the both ends are heated, and preforming produced by compression molding by performing regio-oralis formation and weld of a pars basilaris ossis occipitalis can also be obtained by the ability to carry out biaxial extension.

[0032] It is also possible to use a container of this invention with un-extending, and extending and using is also possible. Extension can be extended in 1 shaft orientations or the direction of a multiple spindle. Existence of extension, its condition, etc. can be suitably selected according to a use.

[0033] A film and a sheet of this invention can be obtained with a conventional method using a resin composition of this invention.

[0034]

[Example] Next, working example and a comparative example explain this invention still more concretely.

[Measuring method]

(a) The relative viscosity polyamide of polyamide was dissolved in concentrated sulfuric acid 96% so that it might become the concentration of 1 g/dl, and down flowing time was measured at 25 °C using the Ubbelohde viscometer. The value which broke sample-solution down flowing time by solvent down flowing time was made into the relative viscosity of a sample. When adjusting the sample-solution concentration of the polyamide containing a sheet silicate to 1 g/dl, it was made for the concentration of the polyamide except a sheet silicate to be 1 g/dl in consideration of the concentration of the sheet silicate contained beforehand.

(b) Intrinsic viscosity phenol / tetrachloroethane of PET = it measured at the temperature of 25 °C using the Ubbelohde viscometer using 60/40 (weight ratio) of mixed solvents.

(c) About the pellet of the polyamide reinforced with the dispersibility (1) silicate layers of the silicate layers in polyamide, it measured using wide angle X-ray diffractometer (the Rigaku make, RAD-rB type), and the dispersibility of the silicate layers in polyamide was evaluated. When the peak of c shaft orientations originating in the layer structure observed in the sheet silicate of the raw material was not accepted, it was considered that silicate layers were distributing with the molecular level in a polyamide matrix.

(d) The pellet of the polyamide reinforced with the dispersibility (2) silicate layers of the silicate layers in polyamide was started small, and embedding of this was carried out to the epoxy resin, and it started to the ultrathin section with the diamond knife. About this ultrathin section, electron microscope photograph observation was performed using the transmission electron



microscope (JEOL make, JEM-200CX type, and accelerating voltage 100kv), and the dispersibility of the silicate layers in polyamide was evaluated.

(e) After [ freezing treatment ] splitting of the piece of shaping of the size resin composition of the polyamide domain phase in a resin composition is carried out with liquid nitrogen. Weld slag coating of Au/Pd 20nm was performed, and it measured with the photograph taken with the field emission type operation electron microscope (Hitachi S-400 type and accelerating voltage 4kv, secondary electron image mode).

(f) The pellet of the polyamide reinforced with the content silicate layers of the silicate layers in polyamide was weighed precisely to the porcelain crucible, and it asked by measuring the ash content after carrying out incineration processing (incineration processing) for 15 hours with the electric furnace held to 500 \*\*.

Content [ of silicate layers ] (% of the weight) = [(ash weight) / (weight of a sample)] According to ASTM D-3985-81, various kinds of oxygen or carbon dioxide transmission quantity of the sheet of thickness were measured using gas permeability measuring device MOCANOX-TRAN-100A by x100 (g) oxygen or a carbon dioxide permeability coefficient modern control company. Measurement was performed under 23 \*\*, 100 %RH, and 1-atmosphere conditions, and oxygen or a carbon dioxide permeability coefficient was calculated from the following formula.

Oxygen permeability coefficient (ml-mm/m<sup>2</sup>, 24hrs, and atm) = oxygen transmission quantity (ml/m<sup>2</sup>, 24hrs, and atm) x thickness (mm)

Carbon dioxide permeability coefficient (ml-mm/m<sup>2</sup>, 24hrs, and atm) = carbon dioxide transmission quantity (ml/m<sup>2</sup>, 24hrs, and atm) x thickness (mm)

This value serves as an index of gas barrier property, and a smaller thing has better gas barrier property.

[0035][Reference example 1] 10 kg of preparation epsilon caprolactam of the polyamide (P-1) reinforced with silicate layers, 1 kg of water, and a swelling fluoride mica system mineral (the CO-OP CHEMICAL CO., LTD. make and SOMASHIFU "ME-100".) interlaminar distance [ ] of the silicate layers measured through wide angle X-rays -- the polyamide (P-1) which mixed 9.6A and 12.5A 200 g, put this into the reacting can of 30 l. of inner capacity, and was reinforced with silicate layers by the following method -- having prepared . That is, pressure up was carried out to the pressure of 15 kg / cm<sup>2</sup>, having heated at 260 \*\* and discharging pressure into a steam gradually stirring the contents of a reacting can. Then, the pressure of 15 kg / cm<sup>2</sup>, temperature After keeping at 260 \*\* and polymerizing for 2 hours, pressure was discharged to ordinary pressure over 1 hour. Then, it polymerized for 40 minutes in 260 \*\* under ordinary pressure. When the polymerization was completed, the resultant was paid out of the reacting can, this was cut, and it was considered as the pellet. Subsequently, the polyamide which performed refinement processing for 3 hours, dried the obtained pellet with 95 \*\* hot water, and was reinforced with silicate layers was obtained. The relative viscosity of this polyamide (P-1) was 2.8. The place which performed wide angle X diffraction measurement about the pellet of this polyamide (P-1). It turned out that the peak originating in the layer structure observed in the swelling fluoride mica system mineral of the raw material is not accepted, but cleavage of the layer structure of silicate is carried out, and it distributes with the molecular level in a polyamide matrix. When transmission electron microscope photograph observation was performed about the pellet of this polyamide (P-1), silicate layers coming apart and distributing with the molecular level in a polyamide matrix was checked. Content of the silicate layers in the polyamide by ash measurement It was 2.1 % of the weight.

[0036][Reference example 2] 8 kg of preparation epsilon caprolactam of the polyamide (P-2)

reinforced with silicate layers, Isophthalic acid 0.9 kg, meta-xylylene diamine The polyamide (P-2) which 1.1 kg, 1 kg of water, and swelling fluoride mica system mineral (CO-OP CHEMICAL CO., LTD. make, SOMASHIFU "ME-100") 300 g were used, and also was reinforced with silicate layers like the reference example 1 was prepared. The relative viscosity of this polyamide (P-2) was 3.0. The place which performed wide angle X diffraction measurement about the pellet of this polyamide (P-2), It turned out that the peak originating in the layer structure observed in the swelling fluoride mica system mineral of the raw material is not accepted, but cleavage of the layer structure of silicate is carried out, and it distributes with the molecular level in a polyamide matrix. When transmission electron microscope photograph observation was performed about the pellet of this polyamide (P-2), silicate layers coming apart and distributing with the molecular level in a polyamide matrix was checked. Content of the silicate layers in the polyamide by ash measurement It was 2.8 % of the weight.

[0037]The polyamide (P-1) reinforced with PET of working example 1 and comparative example 1 intrinsic-viscosity 1.0 and the silicate layers of the reference example 1 is prepared, After having supplied PET from the 1st feed hopper, supplying P-1 from the 2nd feed hopper using the biaxial extrusion machine which has the next screw constitution and performing melt kneading, it paid strand shape out of the dice, and pelletized after cooling using the strand cutter. Under the present circumstances, the amount of supply is PET :P It was referred to as -1=8:2 (weight ratio). [A biaxial extrusion machine / screw constitution]

Screw outer diameter : - 45 mm and ratio of length to diameter, 30 and the 2nd feed hopper position : = Downstream [ of the 1st feed hopper ], downstream [ of ratio-of-length-to-diameter=15 / the / the position and ] -- kneading zone [ of one ]: -- number-of-sheets [ of size ratio-of-length-to-diameter=1/4 kneading disk ]: of the position kneading disk of upstream ratio-of-length-to-diameter=2 of the 2nd feed hopper -- the [ six sheet and ] -- kneading zone [ of two ]: -- the 2nd feed hopper. Number-of-sheets:4 sheet and cylinder temperature which is size ratio-of-length-to-diameter=1/[ of the position kneading disk of ratio-of-length-to-diameter=2 ] 4 kneading disk: The upstream of the 2nd feed hopper 290 \*\*, Downstream Injection molding after drying the resin composition pellet obtained 270 \*\*. When the 110mmx4mmx12.5mm specimen was created and the domain phase size of P-1 ingredient was measured, it was an average of 5 micrometers. Next, this pellet is extruded by 270 \*\* using the extruder provided with the T die, and it is thickness. Produce 700 micrometers and an 800-mm-wide sheet, and it ranks second, It is a diameter by the vacuum forming after heating this sheet for 5 seconds at 150 \*\*. 100 mm, thickness 270 micrometers and a 40-mm-deep cup were produced. This cup was extended uniformly. The same cup was produced using the single layer sheet (thickness 700 micrometers) of PET for comparison (comparative example 1). When these two kinds of cups were filled with 95 \*\* boiling water, any modification was not observed in the cup of this invention to the cup which consists of a PET independent having carried out modification contraction greatly, either. When the transmissivity of oxygen and carbon dioxide was measured with the Mocon method using the sheet (thickness 270 micrometers) cut down from the cup, as shown in Table 1, compared with the case of a PET independent container, gas barrier property was improving greatly with the container of this invention.

Table 1 Gas barrier property of container (cup) Working example 1 comparative-example 1 Oxygen permeability coefficient 0.7 4.5 Carbon dioxide permeability coefficient 2.5 14.5 unit (notes): ml-mm/m<sup>2</sup>, 24hrs, and atm[0038]The polyamide (P-2) reinforced with PET of working example 2 and comparative example 2 intrinsic-viscosity 1.0 and the silicate layers of the reference example 2 was prepared, and it pelletized, after performing melt kneading on the same

conditions as working example 1 using the biaxial extrusion machine which has the same screw constitution as working example 1. Under the present circumstances, the amount of supply is PET :P It was referred to as -2=8:2 (weight ratio). Injection molding after drying the obtained resin composition pellet When the 110mmx4mmx12.5mm specimen was created and the domain phase size of P-2 ingredients was measured, it was an average of 3 micrometers. Next, an injection molding machine is used for this pellet. Fabricate at the temperature of 280 \*\*, produce preforming (131 mm in length, the outer diameter of 25 mm, and 4 mm in thickness), and it ranks second, This preforming is moved to a biaxial extension blow machine, and skin temperature It heated until it became 100 \*\*, and biaxial stretch blow molding was performed, and the biaxial extension bottle was produced. The size of the obtained bottle is height, 308 mm, the outer diameter of 91.5 mm, thickness 370 micrometers and content volume It was 1.5 l. The same biaxial extension bottle was produced using monolayer preforming (4 mm in thickness) of PET for comparison (comparative example 2). When these two kinds of bottles were filled with 95 \*\* boiling water, any modification was not observed in the bottle of this invention to the bottle which consists of a PET independent having carried out modification contraction greatly, either. When oxygen and a carbon dioxide permeability coefficient were measured with the Mocon method using the sheet (thickness 370 micrometers) cut down from the bottle, as shown in Table 2, compared with the case of a PET independent container, gas barrier property was improving greatly with the container of this invention.

Table 2 Gas barrier property of container (bottle) Working example 2 comparative-example 2  
 Oxygen permeability coefficient 0.9 5.0 Carbon dioxide permeability coefficient 2.0 15.2 unit  
 (notes): ml-mm/m<sup>2</sup>, 24hrs, and atm[0039]

[Effect of the Invention]According to this invention, when it uses as the resin composition which can be used as a container and a film excellent in heat resistance and gas barrier property, or a sheet, especially a container, the new resin composition which enables pasteurization under the high temperature filling and application of pressure of contents is obtained.

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[Translation done.]